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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/446,144	03/02/2000	CARLO RUBBIA	P5634	1854

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EXAMINER
KEITH, JACK W

ART UNIT	PAPER NUMBER
3641	

DATE MAILED: 01/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

SK

Office Action Summary

Application No.	Applicant(s)
09/446,144	Rubbia
Examiner	**Art Unit**
Jack Keith	3641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jun 24, 2002*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above, claim(s) *10, 11, 13-16, 26, 27, 29, 30, and 33-48* is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-9, 12, 17-25, 28, 31, and 32* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 3
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restriction

1. Applicant's election with traverse of II, A, a, v and BB in Paper No. 12 is acknowledged.

Applicant traversed the lack of unity of Paper no. 11 citing that no exact reason for the lack of unity beyond the international search report basis was provided by the examiner.

As set forth previously in Paper no. 11 Annex B of the MPEP states when an independent claim does not avoid the prior art (e.g., US 5,160,696) as in applicants' case then the question whether there is still an inventive link between all the claims dependent on that claim is carefully considered. As there is no link remaining, an objection to lack of unity a *posteriori* of the genus/species is Proper.

Accordingly, the Lack of Unity set forth is proper and is Final.

2. Claims 10-11, 13-15, 26-27, 29-30, 33-34, 36, 38-39, 42-43 and 45-48 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 12.

Claims 16, 35, 37, 40-41 and 44 are further withdrawn by the examiner pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim.

3. Accordingly, claims 1-9, 12, 17-25, 28 and 31-32 read on the elected species. An action on the merits follows.

Specification

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention, i.e. failing to provide an enabling disclosure. Some examples are:

There is no adequate description nor enabling disclosure of the parameters of the specific operative embodiments of the invention, including the system configuration (i.e., exact composition of the transmutation product (i.e., density and ratio of exposed material to diffusing medium, target consistency (i.e., how mixed)), focusing of the proton beam on the target (i.e., does the beam strike the target only in one area or is the beam focused to strike the target circumferentially, etc.), beam application (i.e., intensity, pulsed, continuous, times applied, etc.), operative system temperatures and pressures of transmutation system, etc.

It is considered for the reasons set forth above that the examiner has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the applicant itself to inform, not to direct others to find out for themselves; In re Gardner et al, 166

U.S.P.Q. 138, In re Scarbrough, 182 U.S.P.Q. 298. Note that the disclosure must enable a person skilled in the art to practice the invention without having to design structure not shown to be readily available in the art; In re Hirsch, 131 U.S.P.Q. 198.

Claim Rejections - 35 USC § 112

6. Claims 1-9, 12, 17-25, 28 and 31-32 are rejected under 35 U.S.C. 112, first paragraph for the reasons set forth in section 5 above.

7. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. .

As claimed there appears to be at least two separate diffusing mediums. There is no indication of how and in what manner the diffusing medium provides for the separation of exposed material from the heavy elements in one portion while in another portion the exposed material and heavy elements are combined. According to the figures there are two diffusing medium separate from one another.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-9, 12, 17-25, 28 and 31-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claims 1 and 17 contain the clauses "so arranged that" as used this clauses appears to provide language that suggests or makes optional but does not require steps to be performed or does not limit the scope of a claim or claim limitation (MPEP § 2106(II,C)). Accordingly, the metes and bound of the claim can not be ascertained by one having ordinary skill in the art.

b. The term "portion" in claims 3, 4, 18 and 19 is a relative term which renders the claim indefinite. The term "portion" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Accordingly, the degree to which the neutron moderator surrounds the diffusing medium is held to be indefinite.

c. The term "region" in claims 5 and 20 is a relative term which renders the claim indefinite. The term "region" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Accordingly, the degree to which the diffusing medium is separated from the exposed material is held to be indefinite.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-9, 12, 17-20, 23-25 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Bowman (5,160,696).

Bowman (see entire document) discloses an apparatus capable of meeting applicant's claimed inventive concept. Referring to figure 4 Bowman discloses a transmutation system wherein a material (actinide waste, fission products, Tc^{99}, I^{129}, etc.) stored in container (98) is subjected to a neutron flux produced a high energy particle beam (80) on a spallation target. The exposed material of container (98) is distributed in a first neutron diffusing medium (molten salt) surrounding the neutron source (80), the first neutron diffusing medium being transparent to the produced neutrons and arranged so that the neutron scattering properties of the diffusing medium substantially enhance the neutron flux originating from the source to which the material exposed. Note here that the molten salt of Bowman contains beryllium a known neutron multiplier, thus the molten salt of Bowman enhances the neutron flux of the source.

With regard to the distance, occupied by the first diffusing medium, between the neutron source (80) and the exposed material (98) being at least one order of magnitude larger than the diffusion coefficient for elastic neutron scattering with the first diffusing medium it appears inherent that the physical separation of the neutron source (80) and the container (98) provides at the minimum the specified distance. As to limitations which are considered to be inherent in a reference, note the case law of In re Ludtke, 169 U.S.P.Q. 563; In re Swinehart, 169 U.S.P.Q.

226; In re Fitzgerald, 205 U.S.P.Q. 594; In re Best et al, 195 U.S.P.Q. 430; and In re Brown, 173 U.S.P.Q. 685, 688.

The first diffusing medium of Bowman further provides for the at least a portion of the diffusing medium (molten salt) to contain heavy elements (see column 11, lines 22+), thus neutron interactions with said heavy elements would result in slowing energies of the neutrons originating from the neutron source.

Bowman further discloses a deuterated water moderator (44) surrounding a portion of the diffusing medium (molten salt).

Note that Bowman discloses two diffusing mediums. The first medium being the molten salt as set forth above. The second being the liquid metal (Pb-Bi) spallation target being free of exposed material (98) and located between the moderator (44) and the diffusing medium (molten salt).

Additionally note that Bowman further provides for extraction of useful isotopes and the extraction of heat via a heat exchanger/turbine system.

While patent drawings are not drawn to scale, relationships clearly shown in the drawings of a reference patent cannot be disregarded in determining the patentability of claims. See In re Mraz, 59 CCPA 866, 455 F.2d 1069, 173 USPQ 25 (1972).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowman ('696) as applied to claims above 1-9, 12, 17-20, 23-25 and 28 and further in view of Borst (3,197,375).

As set forth above Bowman discloses applicant's inventive concept; however, Bowman does not disclose the use of carbon as a moderating material.

Borst teaches the use of carbon/graphite as a neutron moderating material in the same field of endeavor for the purpose of enhancing nuclear reactions by slowing neutrons to thermal energies. See column 1, lines 33+.

Although Borst does not disclose the particular dimensions set forth by applicant for his moderator it is within the skill level of the ordinary artisan to optimize the moderator to promote desired end result. Here such would be the transmutation of the exposed material. See MPEP § 2144.05 II (A) - Optimization within the prior art conditions.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the transmutation system of Bowman to have included the

carbon/graphite moderator teachings of Borst as such results are in no more than the utilization of conventionally known moderating materials within the nuclear art.

14. Claims 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowman (`696) as applied to claims above 1-9, 12, 17-20, 23-25 and 28 and further in view of Ruddock (4,123,497).

As set forth above Bowman discloses applicant's inventive concept; however, Bowman does not disclose the transmutation of radioisotope Mo^{98} to Tc^{99}.

Ruddock teaches the transmutation of Mo^{98} via neutron capture in a nuclear reactor environment in the same field of endeavor for the purpose of producing medically beneficial radioisotope Tc^{99}. Ruddock further teaches the exposed material Mo^{98} being in a phosphomolybdate complex salt being in an alumina matrix from which Tc^{99} is extracted. See entire document.

Clearly, transmutation of Mo^{98} by neutron activation is obvious as is evident by the teachings of Ruddock. One skilled in the nuclear art would realize the substitution of one transmutation material for another. That is the substitution of Mo^{98} into the container (98) holding the transmuted material of Bowman would have been obvious to one having ordinary skill in the art at the time the invention was made as such results are in no more than the utilization of conventionally known methods neutron activation within the nuclear art.

Conclusion

15. The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Keith whose telephone number is (703) 306-5752. The examiner can normally be reached on Monday through Friday from 7:00 to 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone, can be reached on (703) 306-4198. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-7687.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

Jack Keith
Examiner,
Art Unit 3641

jwk

January 8, 2003